

# TRANSACTIONS

OF THE

## CHICAGO SURGICAL SOCIETY.

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*Stated Meeting, April 4, 1904.*

The President, E. WYLLYS ANDREWS, M.D., in the Chair.

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### METAPNEUMONIC EMPYEMA.

DR. ARTHUR DEAN BEVAN showed a young man who gave a history of pneumonia and a metapneumonic empyema. A rib had been resected and an empyema of the left side drained eight months before by another surgeon, after which the opening closed. This was followed by a reaccumulation of the fluid, and when Dr. Bevan saw the patient the entire left side of the chest was full of pus up to the clavicle, and the apex beat was in the middle line. There was a small discharging fistula in the third intercostal space two inches to the left of the sternum, and through this a probe could outline the entire cavity. The patient was septic and in bad condition. An extensive U-shaped incision was made and the soft tissues lifted up. A resection was made from the third rib to the tenth inclusive. This was done subperiosteally. After lifting up the very large flap, and after the resection had been made, all of the intercostal tissues, including the pleura, which was three-quarters of an inch in thickness, were cut away with strong scissors. The U-shaped flap was then drawn down and a tube as large as the thumb introduced to the apex of the cavity and the flap stitched in position. Some gauze was also packed in. The operation was done the 7th of January. The patient had some sepsis for a considerable period after the operation, about ten days; in other words, the temperature continued. However, this condition gradually improved. About four weeks after the operation, an outline of the cavity which remained

was obtained by injecting iodoform emulsion into the cavity, sealing the opening, and taking an X-ray picture. The skiagraph showed a fine ribbon-like cavity which reached almost to the clavicle. The patient was then put at work blowing up an air-bag. Every day, as he blew up the air-bag, expansion of the compressed lung was effected by the forced expiration used. As a matter of fact, there was apparently no lung tissue on the left side at the time of the operation. Now, there was a fair amount of lung tissue occupying the upper left apex. The entire wound had healed. Patient was now practising gymnastics, and his general condition was excellent.

Dr. Bevan stated that this was the seventh or eighth Schede operation he had done, and it was the most satisfactory one of the entire group. He thought the excellent result was due primarily to two facts,—very extensive resections of the ribs, including the pleura, which latter he had omitted in some of his cases, and to the use of an air-bag, as stated, to expand the lung at the apex. In most of his previous cases he had failed to obliterate the cavity at the apex, or else it had required a long time to accomplish it.

He showed three skiagraphs, one showing the case before the operation; the second when there was still a ribbon-like cavity containing iodoform emulsion, and a third showing the case as it was to-day completely cured.

#### CERVICAL RIB.

DR. D. N. EISENDRATH showed a skiagraph from a patient, fifty-six years of age, who had consulted him on account of recurrent hæmorrhages apparently from the lungs. During an examination of the chest, while palpating above the left clavicle, a hard mass about the size of a fist was detected. Careful examination showed this to be a cervical rib. An X-ray picture taken showed well the cervical rib.

Dr. Eisendrath stated that there were four types of these cases,—one in which the cervical ribs were complete and articulated with the sternum; the second type, in which they were usually from three to four inches in length, and articulated with the first thoracic rib, or with the sternum by means of a ligament, and two other forms in which they were rudimentary, one being

about an inch in length, and a fourth, in which the cervical rib was simply a tubercle projecting from the transverse process.

As regards the origin of this cervical rib, the only way one could understand it was to consider it as a reversion of type of the mammalia towards some of the elementary forms. This cervical rib existed in reptiles. It must be regarded as an abnormal development of the anterior nucleus of the transverse process of the seventh cervical vertebra.

#### PSEUDO-ATLANTO-AXOID DISLOCATION.

DR. EISENDRATH presented skiagraphs which were important from a medicolegal stand-point.

During the month of December, there was tried in a Chicago court the case of a young woman who had alternating attacks of paralysis of the lower extremities, attacks of blindness, paralysis of the left upper extremity, and who claimed to have sustained an injury as the result of being pulled up on to a car platform by a conductor. The case seemed to be one of pure hysteria, but two X-ray pictures were exhibited by her lawyer, which apparently showed a dislocation of the atlas upon the axis. The speaker was called in the case as an expert, and after having been shown the skiagraphs gave as his opinion that the case was a sham, and in order to prove that this was not a dislocation of the atlas upon the axis, he had an X-ray picture taken of his own spine.

The first skiagraph he presented showed the normal spine where the atlas rests upon the axis. The second picture he had taken with his head in the same position as that in which the skiagraph of the woman's head was taken, the head stretching forward, and he thought, unless this skiagraph was labelled, it would be mistaken for a dislocation of the atlas upon the axis. It hardly seemed possible that a normal human being could produce such a dislocation. However, it was one of the great points of contention in the case, in that it was simply shown what could be done by the normal human spine. He thought this was simply the beginning of the possibilities of studying practical normal skiagraphs.

#### ADENOMA OF THE MUCOUS GLANDS OF THE LIPS AS A CAUSE OF MACROCHEILIA.

DR. D. N. EISENDRATH read a paper with the above title, for which see page 320.

## RESULTS IN ABDOMINAL WALL SUTURE.

DR. CHARLES DAVISON read a paper with the above title, for which see page 373.

DR. A. J. OCHSNER said there were three elements which must be considered in the closure of abdominal wounds. The first one was accurate coaptation; second, an aseptic wound, and, third, the absence of pressure necrosis. He thought all of these elements were taken care of by the method that had been described. The method made it necessary to have the layers distinctly in view, because the suturing could not be accurate unless one had these layers in mind.

Silkworm gut was easily rendered aseptic, and it was almost impossible to make it septic during an operation. The fact that one had a long silkworm-gut string, which passed in and out, made pressure necrosis impossible, because it did not definitely constrict any given point of tissue.

It was foolish for one to say anything about one's personal experience with postoperative hernia without having followed all of his cases, so that he would not say what could be expected in this regard. But he knew that if these three conditions were carried out, it did not make much difference what suture material was used, or what particular method one employed, one would not get postoperative hernia.

Last year he had approximately 740 abdominal sections, and of this number he did not believe there would be a ventral hernia in any case in which the three principles referred to were employed.

DR. D. N. EISENDRATH had seen the method of Dr. Davison used very satisfactorily. Personally, he had had practically no experience with it other than to assist in some operation in which it had been employed. To one point he would like to call attention. From the umbilicus downward, practically the anterior sheath of the rectus was made up of the aponeurosis of the three muscles, so that if these were pulled together tightly it was the greatest factor in the prevention of hernia. The point that seemed difficult in Dr. Davison's method was how the sutures could be pulled out afterwards, especially the deeper ones, say, in a case of umbilical hernia. He asked Dr. Davison whether he had experienced any difficulty after ten or twelve days had elapsed in unloosening the pseudo-knot and removing the sutures. The

subcutaneous suture enabled one to get the most beautiful line of union in the superficial lines except at the ends of the wound.

DR. WM. M. HARSHA said he had used Dr. Davison's suture in probably twenty or more cases. There had been no hernia in any case that he had been able to follow up; but the skin cicatrix had spread in some cases. There had apparently been no giving way in the fascia, so far as he could tell, or in the peritoneum. In fat patients, in cases where the layer of adipose tissue is quite thick, while the belly of the muscle came together between fascia and peritoneum, the fat did not seem to bulge out, and the skin in some cases had stretched over. This had been one difficulty he had seen in the cases he had operated upon by this method. He had had no case of infection. By this method it made the neatest and nicest scar when one took the sutures out.

DR. C. C. ROGERS had used the Davison suture in eighteen cases, five of them being emergency cases, the others hospital cases, with one case of infection. This patient recovered in five days after the removal of the stitch. In thirteen cases there had been no hernia, so far as he knew; the others he had not seen or heard of recently. He had had no difficulty in removing the stitches. To prevent spreading of the scar of the skin referred to, in fat subjects, where the abdominal fat was thick, he inserted an extra stitch, suturing the fat together with a continuous stitch and bringing out the ends, as the skin and peritoneum were stitched, in that way obviating any dead space.

DR. CARL WAGNER said he had used the longitudinal wire suture in several cases, but had abandoned it on account of the wound in two cases having opened. He thought the wire was too stiff, and that silkworm gut was preferable, in that it was much smoother and more elastic.

DR. E. WYLLYS ANDREWS said that one virtue of the longitudinal silkworm-gut stitch lay in the fact that it was semirigid and semiflexible, becoming moulded to the tissues and not stretching. With regard to the subcuticular stitch, he had used it in hundreds of herniotomies. In the case of a long incision, for example, like that posterior to the sternomastoid muscle in an operation on the glands of the neck, it was better not to insert the subcuticular stitch in one long piece, because, when one came to remove it, it would break so easily. The late Dr. Fenger had taught this. He had found it out in his own experience. One

should begin at the ends and make the two pieces meet, so as to draw it out in two parts. He thought wire had the same rigidity combined with flexibility as gut, and greater strength for the same diameter. The secret of getting out these wires easily afterwards lay in one step of the technique, which was this: As soon as one had finished the stitch, he should grasp the two ends of the wire strongly and seesaw it as he would with a chain-saw. This straightened the wire, so that it did not look like a wavy line, but a straight line, and the tissues became a wavy line. The wire was perfectly loose in the tissues, just like a harelip pin, when two weeks after its insertion one pulls it out straight.

DR. DAVISON, in closing the discussion, said that credit should be given to Halsted, of Baltimore, as the originator of the subcuticular stitch. The first he knew of the longitudinal stitch being used was from a description of it by Haughey, of Ann Arbor, in 1896. At about the same time Haggard, now of Nashville, but at that time an interne in a New York hospital, used it, failed to get it out, and quit its use. The only thing he claimed which was original with himself was that he used the knot which fastened the silkworm-gut suture in position. Every other element of it had been in use for a long time. With silver wire one could not tie a knot and get the wire out again without breaking it. He experimented carefully for a year with many cases without a knot, and while the majority of them were all right, every once in a while the suture would pull out, thereby causing the wound to spread.

Silkworm gut was elastic and tended to straighten itself. If it were allowed to remain in the tissues for, say, two weeks, it would produce a microscopical area of pressure necrosis around it, which made it easy to remove. There were three elements which interfered with getting a silkworm-gut suture out: (1) Imperfect silkworm gut. If one used silkworm gut that had been treated with chemicals in its sterilization, it was likely to fray, and it would catch and split. He obtained the best selected strands of silkworm gut he could procure, the largest, strongest size Spanish silkworm gut. One should be careful to get gut that was strong, perfectly round and smooth, so that there would be no catching, not treated by chemicals at all, but simply boiled previous to operation, which made the strands soft and pliable like a string. (2) The next defect was back stitching. In working

in a deep wound, if one was not careful he would back stitch in going from side to side in the fascia. If this was done, one had to break the gut at that point to get it out and remove it in two parts. (3) The position of the patient when the sutures were being removed. When the patient lay on his back, as one frightened him in removing the stitches, he made tense all the abdominal muscles and interfered with the removal; whereas, if the shoulders were elevated on the pillow, the legs and thighs flexed, the abdominal muscles were relaxed, and the stitches could be removed more easily. Usually he cut the stitch off an inch longer than necessary, for the reason that in case it should break off he had something to pull it from the other side, cleansing it each time before attempting to pull it out. He rolled the proximal end on a gauze sponge and artery forceps; he bit on the covered strand, rolled the sponge and strand around the artery forceps, and when the patient was in the right position he held the artery forceps just like a cork-screw and made gradual traction, thus removing the sutures.

As to widening of the scar, he had been operated on for appendicitis himself; this stitch had been used, and he had had ample opportunity and chance to examine it. If there was much fatty tissue, there would be absorption of the superficial part of the skin, and perhaps widening of the scar, but this absorption would occur in the injured part of the cuticle. If there was fat of any consequence, he would put in an extra stitch through the fat back and forth, which would obliterate a dead space, so that there was no chance for blood to accumulate. If blood did accumulate, each strand acted as a capillary drain, draining the blood into the dressings.

In all of his series of operations he had never had to tie an artery in the abdominal wall; he had always succeeded in arresting hæmorrhage by torsion or by pressure of one of the sutures.

As to long abdominal incisions, if he were to make an unusually long abdominal incision, he would insert the sutures in sections, making of them complete sets as if there were separate wounds, not to put any great length of silkworm gut in a single wound. He had made the sutures four, five, and six inches long and removed them without any trouble.

He wanted to say, again, that the only claim of originality he made was the use of the knot which fastened the longitudinal suture in position.

## RESECTION OF FOUR FEET OF SMALL INTESTINE FOR PERFORATION OF THE UTERUS DURING CURETTAGE.

DR. WILLIAM HESSERT said that the case whose report follows is of such an unusual nature that its publication is deemed justifiable. Perforation of the uterus during curettage is an accident which occurs not infrequently, but the reports of cases are obviously not found in the literature. It has occurred not only in the hands of the novice, but even the more expert have at times committed this blunder, not to mention the many fatalities in the hands of midwives, or where the wound was self-inflicted by the woman. All with any experience with curettage for incomplete miscarriage can testify that sometimes unusual care is necessary to avoid perforating the thin, soft uterus. A curettement at all times, but especially of a pregnant uterus, is an operation which should demand the greatest care. It should be preceded by an accurate anatomic and pathologic diagnosis of the pelvic condition, and its performance guided by the carefulness and judgment which come with experience.

The patient, a woman of forty-six years, and the mother of five children, had a miscarriage, and curettage, one year ago. She had become pregnant again, and had an incomplete miscarriage at the third month. She was attended by a midwife, who called her regular family doctor on account of hæmorrhage. The doctor attempted to empty the uterus without an anæsthetic, but found this impossible, so he packed with gauze. Next morning the patient was put under an anæsthetic at her home, for curettage. Her general condition was good, and there was only a slight rise of temperature. A pair of Goodell cervical divulsers was introduced into the cervix and the blades separated. After accomplishing what seemed sufficient dilatation, the blades were withdrawn and a placental forceps introduced. Something soft and slippery was felt in the grasp of the forceps, which was supposed to be membranes and placenta. After some traction and twisting, a mass of material was delivered on the towels outside. On closer inspection it was found to be a two-foot loop of small intestine. The gut was then hastily pushed back in the direction from whence it came, and after tamponnade of the vagina further operating was deferred.

The writer saw the case in consultation in the afternoon,



about four hours after the above incident. The woman had recovered from the effects of the anæsthetic. Her general condition was fair; pulse 120, of fair quality, but somewhat intermittent; temperature 101° F. She complained of no pain, only felt weak. Heart and lungs negative. Abdomen soft and not distended, and examination was negative save for some slight tenderness in hypogastric region. Urine negative. The packing in vagina was not disturbed. On the basis of the history, an immediate laparotomy was demanded, and the patient removed to the hospital.

*Operation.*—Seven hours after first operation. Abdomen and external genitalia carefully prepared, including vagina, from which tampon was removed. No gut seen protruding from cervix. The latter was large and patulous, but presented nothing abnormal in appearance. Median incision above pubes. About two ounces of fresh blood-clot in pelvis, but no active bleeding anywhere. A loop of small intestine was lifted out from pelvis; it was completely detached from its mesentery. All the detached portion of intestine, together with the mesentery, was now delivered outside of the abdomen. One loop of gut entered a small rent in the anterior surface of the uterus. On making slight traction this portion was pulled out. On surveying the damage, it was revealed that the gut for a distance of over three feet was completely severed from the mesentery, no portion of the latter being adherent to the gut. The latter was separated from its mesentery as clean as one does in the post-mortem room. There was, of course, an absolute indication for resection, as this section of intestine was completely deprived of its blood supply.

The intestine was not distended; it was somewhat dull and livid, and presented some hæmorrhagic areas here and there. There was no perforation.

A typical end-to-end anastomosis was done, using the Murphy button. Four feet of intestine were removed. The free end of mesentery was trimmed, the larger vessels ligated with catgut, and the free edge brought together with a running catgut suture. Pelvis swabbed clean of clots, there being no escape of fæcal matter. The uterus was retroflexed and about the size of one's fist. On the anterior surface, midway between the internal os and the fundus, there was a transverse opening, two and one-half centimetres long, just large enough to admit the index-finger. The false passage led diagonally through the wall of the

uterus, terminating at the internal os, this being also the point where the direction of the cervical canal took its backward dip. Cavity of uterus explored with finger, and no placental débris detected. It was practically empty. With a curved dressing forceps a strand of iodoform gauze was inserted into the false passage, so that it would emerge into vagina. The other end of the gauze was then packed into the uterine cavity. The wound in uterus was now closed with three deep catgut sutures. There being no other injuries, the abdomen was closed in the usual manner, without drainage. A gauze tampon inserted into vagina, and one litre normal salt infusion given by infusion.

Patient left the operating room in fair condition; pulse 130.

*Subsequent History.*—There was little shock following the operation, but the patient was given another litre of saline solution per infusion the same night. For several days the pulse was irregular, but finally became regular and the rate about 100. Temperature did not rise over 100° F. Small amount of bloody flow for a few days. Tampon and uterine drain removed on third day, and not reinserted. Liquid diet, but no milk allowed. Bowels moved spontaneously on second day, and every day after, by enema, if necessary. Suture removed on eighth day; healing by primary union. Button passed on tenth day. Left hospital after three weeks, entirely well, although somewhat weak.

#### CARCINOMA OF THE HEAD OF THE PANCREAS.

DR. HESSERT showed a specimen of carcinoma of the head of the pancreas. The history of the case as given briefly was as follows: The woman was seventy years of age and had been previously healthy. She was seen four months ago on account of jaundice. The latter for several weeks was mild, and there were scarcely any other symptoms. Stools clay-colored, bowels costive; no pain, and never any pain previous to present illness. Examination of abdomen negative. After four weeks' duration the jaundice had deepened, there was considerable itching, diminished appetite, and general weakness. Examination showed liver to be somewhat enlarged and generally tender. No tumor could be made out; urine contained bile and small amount of albumen. After six weeks' duration of the trouble there was still no subsidence of the symptoms, as might be expected in an ordinary case of catarrhal jaundice. Furthermore, the liver was still more

enlarged, and he thought that he could feel a mass vaguely deep in the right hypochondriac region. The question of malignancy arose, and he called Dr. Favill in consultation. The diagnosis lay between gall-stones, catarrhal icterus, and cancer. The utter absence of pain spoke against gall-stones; the clinical course pointed to a graver disease than catarrhal icterus; a diagnosis of probable malignancy was made.

The day following the consultation the stools became bile-stained again, and patient felt somewhat better.

The patient gradually became worse, the icterus was intense, and the usual cachexia finally ended in death four months after onset of symptoms. It is noteworthy that there was never any pain until near the end, and then not severe.

During the last month or two the ascites and enlargement of the liver made deep palpation impossible. The itching had also entirely subsided.

At the autopsy, exploration was first made with the hand: the distended gall-bladder contained no stones, and none could be felt in the common duct. He was surprised not to find a large tumor mass, and the only feature palpable was what appeared to be some hardening and enlargement of the head of the pancreas. The duodenum felt normal. When this is compared with the later findings, it is evident that in the performance of an exploratory operation a tumor such as this one might easily be overlooked. The liver, pancreas, and duodenum were removed *in toto*. The former was greatly enlarged and the gall-bladder much distended, as were also all the ducts. The head of the pancreas was enlarged to twice its natural size, and was indurated. On cutting open the duodenum there presented at the site of the papilla a cauliflower-like mass the size of a half dollar. It was elevated one centimetre above the surface of the gut, and was somewhat hard in consistency. Its summit was eroded. On making considerable pressure on gall-bladder, a small amount of bile exuded from an opening in the centre of the mass. A small probe here inserted was caused to enter the common duct. A microscopical examination had not yet been made, as the specimen was preserved intact for gross demonstration. There were no stones.

## APPENDICITIS, WITH PERFORATION OF THE DUODENUM.

DR. D. W. GRAHAM reported the case of a man, aged thirty-seven years, who was admitted to the hospital June 12, 1903. Four years before, he had had a sudden severe attack of pain in the upper right quadrant of the abdomen, with fever, nausea, and vomiting, on account of which he was bedfast ten days. Since then there had been three or four similar but less severe attacks. On admission he gave the history of another attack, beginning three weeks before. Temperature,  $102^{\circ}$  F.; marked rigidity and pressure pain over right hypochondrium. The pain and nausea had noticeably diminished three days before, coincidently with an attack of diarrhœa. There were not now, nor had there been at any time, distinctive symptoms referable to the gall-bladder or the kidney. There was no tenderness over the cæcum. The diagnosis was suppurative inflammation of uncertain origin, but probably connected with the gall-bladder or an abnormally placed appendix. Operation the following day. The usual gall-bladder incision revealed the gall-bladder practically normal and free from stones, but inflammatory adhesions of all the neighboring viscera were found. Following the lines of cleavage pus was discovered well back towards the posterior abdominal wall. From one to two ounces were removed by sponging as it appeared. There was nothing in the pus or the abscess cavity that would indicate the cause of the suppuration. A large counter-tubular drain was made through the loin, with the inner end of the tube in the abscess cavity. The operative wound was closed without drainage. On the following day the discharge through the lumbar drain became profuse and contained bile. It was soon discovered that fluids taken by the mouth would shortly appear in the dressings with large quantities of bile. On the third day, the patient not doing well, the operative wound was opened, some pus found, and drainage established. The patient died on the tenth day.

In the autopsy the appendix measured eleven centimetres in length and was found to pass directly upward behind the ascending colon, its free end being adherent to the psoas muscle and lying behind the curve of the duodenum and attached to it. Six centimetres from the pylorus, and on a level with, and three centimetres to the right of, the biliary papilla was a perforation of the posterior duodenal wall three millimetres in diameter.

The specimen presented showed the relation of the appendix

to the colon, the abscess cavity, and the duodenum. The tip of the appendix, which is bulbous, shows a small perforation, and it forms a part of the abscess wall. The lumen is pervious throughout, and is free from faecal concretions. The relations and position of the duodenal perforation are also well shown.

These findings account for and explain everything in the history of the case, both before and after the operation. When bile and other liquids began to appear in the drainage, perforating ulcer of the duodenum was suspected as the primary lesion. The patient died of suppurative peritonitis, though the infection was limited to the area between the liver and the original focus. The use of the lumbar drain in this case was correct, although in a similar one he would drain through the operative wound as well.

#### AMÆBIC ABSCESS OF THE LIVER, WITH COMPLICATION.

DR. GRAHAM also reported the case of a man, thirty-seven years old, who had never been out of the State of Illinois, a free drinker of whiskey for years, who was admitted to the hospital October 26, 1903. Present trouble began July 19, while walking in the street, with a severe pain in the epigastrium followed by a chill, high temperature, and diffuse abdominal pain. Five weeks later the pain became localized about the right costal arch, and especially marked on deep respiration. He has had no jaundice and no tarry stools. No appetite. Has lost sixty pounds. On examination the liver was found much enlarged, with a friction sound caused by the respiratory movements. The daily temperature ranged from 98° to 103° F. The leucocyte count at this time was 11,000; two weeks later, 15,500. A few days after admission, large quantities of pus appeared with the faeces, with amelioration of the symptoms. This continued for three days. The patient came into his care through Dr. Sippey with the diagnosis of suppuration in the liver. Operation, November 5. The under surface of the right lobe of the liver was very much swollen, projecting forward and downward, and adherent to the colon. Two quarts of pus were removed. Large tubular drain with packing. The pus was sterile so far as could be determined by repeated microscopical and culture tests. No amœbæ could be found in the stools either before or after the operation. Notwithstanding the free discharge of pus which continued, the patient did well for a week following the operation. Then the

sutures of the abdominal wound were cut out and the borders began to slough. In spite of two radical attempts to arrest it by the free use of the knife, scissors, and curette, besides the continued use of the usual antiseptics, the sloughing persisted, and the patient died of exhaustion the thirty-second day after the operation. The sloughing wound extended from Poupart's ligament up onto the chest wall and was eight inches in width. Except at the upper part of this area the peritoneum remained intact. Cultures from the sloughing borders showed only staphylococci and streptococci.

The specimen shows (1) the large sloughing wound of the abdominal wall, which has been preserved intact; (2) the adhesion of the liver to the colon, which represents the point where the abscess was partially evacuated through the colon wall before the operation; (3) the abscess cavity in the liver as large as the fist, notwithstanding the contraction that has taken place; (4) many small abscesses through the liver; (5) numerous ulcers in the mucosa of the colon, with sloughing undermined edges and intercommunicating by channels underneath the mucosa, having all the characteristic features of amœbic ulceration.

The special interest in this case centres in two points, namely, the cause of the abscess and the complication.

While amœbic abscess of the liver is common enough in Southern climates, it is rare for the affection to originate in this latitude. As to the complication, the progressive melting away of the abdominal wall under the influence of ordinary infection, notwithstanding its accessibility and the ease with which the infection could be subjected to every available means for combating it, shows to what extreme degree the tissues may lose their power of resistance from systemic debility.